

10-4 Common Logs

$$\log_{10} x$$

$$\log x$$

Base of 10

The common logs are used in:

- the richter scale
- pH levels
- decibals of sound

Solve

$$\log_{10} x = 1.65$$

$$10^{1.65} = x$$
$$44.7 = x$$

$$\log y = 1.34$$

$$10^{1.34} = y$$
$$21.9 = y$$

$$\log z = 1.08$$

$$10^{1.08} = z$$

Calculator

~~$\log 45 \approx 1.65321$~~ $\log y = 1.65$
 $\log 45 \approx 1.65$

$\log 22 \approx$

$\log 12 \approx$

Solving Exponential Equations

ex

$3^x = 27$

~~$3^x = 3^3$~~
 $x = 3$

Solving Exponential Equations

ex

$3^{2x} = 5$

~~$3^{2(2.7325)} = 5$~~

$$\log 3^{2x} = \log 5$$

$$\frac{2x \log 3}{2 \log 3} = \frac{\log(5)}{(2 \log 3)}$$

$$x = .7325 \checkmark$$

ex

$2^x = 7$

~~$\log 2^x = \log 7$~~

$x \cdot \log 2 = \log 7$

$$x = \frac{\log 7}{\log 2}$$

$$x = 2.8074$$

ex:

$$\frac{1}{2}^x \geq 6$$

Since negative value change symbol

$$x \cdot \log \frac{1}{2} \geq \log 6$$

$$x \leq \frac{\log 6}{\log \frac{1}{2}} \quad x \leq -2.585$$

ex:

$$42^{x-1} = 17^{3x-1}$$

$$(x-1) \log 42 = (3x-1) \log 17$$

$$\begin{array}{rcl} x \log 42 - \log 42 & = & 3x \log 17 - \log 17 \\ -x \log 42 + \log 17 & & -3x \log 42 + \log 42 \end{array}$$

$$\begin{array}{rcl} \log 17 - \log 42 & = & 3x \log 17 - x \log 42 \\ (\log 17 - \log 42) & = & x(3 \log 17 - \log 42) \\ -.1899 & = & x \end{array}$$

p550

~~27-49 odd~~33-41
odd